

7.1 EXERCISES

HOMEWORK KEY

- = **WORKED-OUT SOLUTIONS**
on p. WS1 for Exs. 17, 29, and 37
- ★ = **STANDARDIZED TEST PRACTICE**
Exs. 2, 24, 25, 32, 40, and 41
- ◆ = **MULTIPLE REPRESENTATIONS**
Ex. 42

4 PRACTICE AND APPLY

Assignment Guide

Answer Transparencies
available for all exercises

Basic:

Day 1: pp. 482–485
Exs. 1–10, 15–19, 24–30, 35–39, 45, 49, 53, 56, 59, 62

Average:

Day 1: pp. 482–485
Exs. 1–5, 9–12, 17–20, 24–33, 35–42, 46, 51, 54, 57, 60, 63

Advanced:

Day 1: pp. 482–485
Exs. 1, 2, 12–14, 21–44*, 48, 52, 55, 58, 61, 64

Block:

pp. 482–485
Exs. 1–5, 9–12, 17–20, 24–33, 35–42, 46, 51, 54, 57, 60, 63 (with 7.2)

Differentiated Instruction

See *Algebra 2 Best Practices Toolkit* for suggestions on addressing the needs of a diverse classroom.

Homework Check

For a quick check of student understanding of key concepts, go over the following exercises:

Basic: 6, 8, 18, 35, 37

Average: 9, 11, 20, 35, 38

Advanced: 12, 14, 22, 36, 38

Extra Practice

- Student Edition, p. 1016
- Chapter 7 Resource Book: Practice levels A, B, C, pp. 6–8

Practice Worksheet

An easily-readable reduced practice page (with answers) for this lesson can be found on p. 476C.

SKILL PRACTICE

- A** 1. **VOCABULARY** In the exponential growth model $y = 2.4(1.5)^x$, identify the initial amount, the growth factor, and the percent increase. **2.4, 1.5, 50%**
2. **★ WRITING** What is an asymptote? **An asymptote is a line that a graph approaches very closely but never meets.**

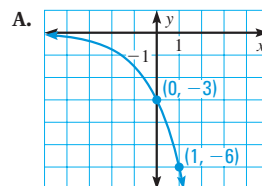
EXAMPLES 1 and 2

on pp. 478–479
for Exs. 3–14

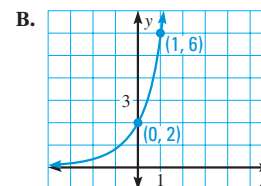
MATCHING GRAPHS

Match the function with its graph.

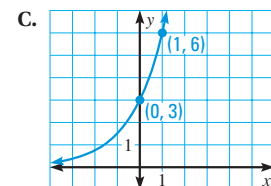
3. $y = 3 \cdot 2^x$ **C**



4. $y = -3 \cdot 2^x$ **A**



5. $y = 2 \cdot 3^x$ **B**



GRAPHING FUNCTIONS

Graph the function. 6–14. See margin.

6. $y = 3^x$

7. $y = -2^x$

8. $f(x) = 5 \cdot 2^x$

9. $y = 5^x$

10. $y = 2 \cdot 4^x$

11. $g(x) = -(1.5)^x$

12. $y = 3\left(\frac{4}{3}\right)^x$

13. $y = \frac{1}{2} \cdot 3^x$

14. $h(x) = -2(2.5)^x$

TRANSLATING GRAPHS

Graph the function. State the domain and range. 15–23. See margin.

15. $y = -3 \cdot 2^{x+2}$

16. $y = 5 \cdot 4^x + 2$

17. $y = 2^{x+1} + 3$

18. $y = 3^{x-2} - 1$

19. $y = 2 \cdot 3^{x-2} - 1$

20. $y = -3 \cdot 4^{x-1} - 2$

21. $f(x) = 6 \cdot 2^{x-3} + 3$

22. $g(x) = 5 \cdot 3^{x+2} - 4$

23. $h(x) = -2 \cdot 5^{x-1} + 1$

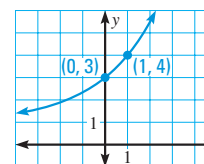
24. **★ MULTIPLE CHOICE** The graph of which function is shown? **B**

(A) $f(x) = 2(1.5)^x - 1$

(B) $f(x) = 2(1.5)^x + 1$

(C) $f(x) = 3(1.5)^x - 1$

(D) $f(x) = 3(1.5)^x + 1$



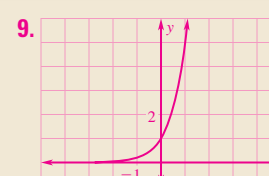
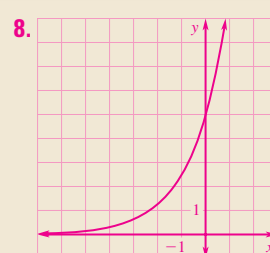
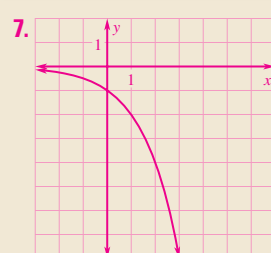
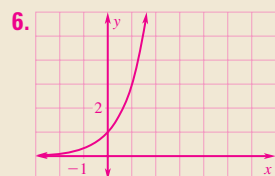
25. **★ MULTIPLE CHOICE** The student enrollment E of a high school was 1310 in 1998 and has increased by 10% per year since then. Which exponential growth model gives the school's student enrollment in terms of t , where t is the number of years since 1998? **D**

(A) $E = 0.1(1310)^t$

(B) $E = 1310(0.1)^t$

(C) $E = 1.1(1310)^t$

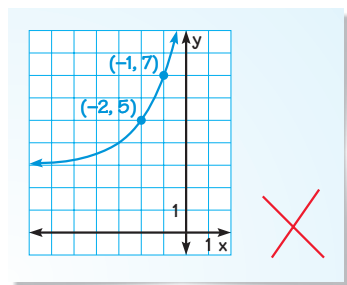
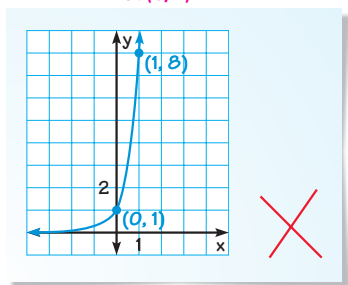
(D) $E = 1310(1.1)^t$



27. The power of $(x - 3)$ translates the parent graph 3 units to the right, not to the left.

ERROR ANALYSIS Describe and correct the error in graphing the function.

26. $y = 2 \cdot 4^x$ The y -intercept should be $(0, 2)$, not $(0, 1)$. 27. $y = 2^{x-3} + 3$ 26, 27. See margin for art.

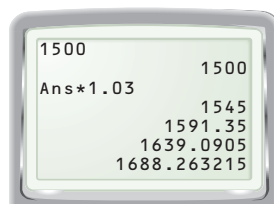


B WRITING MODELS In Exercises 28–30, write an exponential growth model that describes the situation.

28. In 1992, 1219 monk parakeets were observed in the United States. For the next 11 years, about 12% more parakeets were observed each year. $y = 1219(1.12)^t$, where y represents the number of monk parakeets and t represents the number of years since 1992.
29. You deposit \$800 in an account that pays 2% annual interest compounded daily. $A = 800\left(1 + \frac{.02}{365}\right)^{365t}$, where A represents the amount in the account after t years.
30. You purchase an antique table for \$450. The value of the table increases by 6% per year. $y = 450(1.06)^t$, where y represents the value of the table after t years.

31. **GRAPHING CALCULATOR** You deposit \$1500 in a bank account that pays 3% annual interest compounded yearly.

- a. Type 1500 into a graphing calculator and press **ENTER**. Then enter the formula $\text{ANS} \times 1.03$, as shown at the right. Press **ENTER** seven times to find your balance after 7 years. **\$1844.81**
- b. Find the number of years it takes for your balance to exceed \$2500. **18 yr**



32. **★ OPEN-ENDED MATH** Write an exponential function of the form $y = ab^{x-h} + k$ whose graph has a y -intercept of 5 and an asymptote of $y = 2$. **Sample answer: $y = 9 \cdot 3^{x-1} + 2$**

33. **GRAPHING CALCULATOR** Consider the exponential growth function $y = ab^{x-h} + k$ where $a = 2$, $b = 5$, $h = -4$, and $k = 3$. Predict the effect on the function's graph of each change in a , b , h , or k described in parts (a)–(d). Use a graphing calculator to check your prediction.

- a. a changes to 1 b. b changes to 4 c. h changes to 3 d. k changes to -1

C CHALLENGE Consider the exponential function $f(x) = ab^x$.

a. Show that $\frac{f(x+1)}{f(x)} = b$. $\frac{ab^{x+1}}{ab^x} = \frac{b^{x+1}}{b^x} = b$

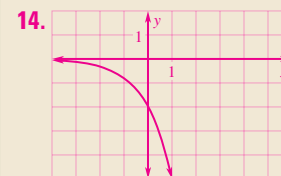
b. Use the result from part (a) to explain why there is no exponential function of the form $f(x) = ab^x$ whose graph passes through the points in the table below.

x	0	1	2	3	4
y	4	4	8	24	72

Sample answer: Since the points $(0, 4)$ and $(1, 4)$ are of the form $f(x)$ and $f(x+1)$, when $f(x)$ and $f(x+1)$ are substituted into the equation from part (a), $b = 1$ and therefore the function is no longer exponential.

Avoiding Common Errors

Exercises 15, 17–23 When graphing translations of exponential functions, some may students do the horizontal shifts in the wrong direction. For example, in Exercise 17 they would translate the graph of $y = 2^x$ right 1 unit and up 3 units, rather than left 1 unit and up 3 units because they associate + with movement from left to right and from bottom to top. To help these students, review graphing quadratic functions of the form $y = a(x - h)^2 + k$, where the vertex is (h, k) .



15–23. See Additional Answers beginning on p. AA1.

